

Appl. No. 10/758,552
Amdt. dated October 3, 2005
Reply to Office Action of June 3, 2005

REMARKS / ARGUMENTS

Summary of the Present Invention

The present development is a catalyst for use in the water-gas-shift reaction. The claims require that the catalyst includes a primary transition metal selected from the group consisting of Group VIII metals, Group IB metal, cadmium and a combination thereof; a transition metal promoter selected from the group consisting of rhenium, niobium, silver, manganese, vanadium, molybdenum, titanium, tungsten and a combination thereof; and a support comprising cerium oxide and an additive selected from gadolinium, samarium, zirconium, lithium, cesium, lanthanum, praseodymium, manganese, titanium, tungsten and combinations thereof. The primary transition metal and the transition metal promoter may each comprise up to about 20 wt% of the catalyst, and in a preferred embodiment the primary transition metal concentration is greater than the transition metal promoter concentration.

The present development also includes a process for preparing a platinum and rhenium promoted catalyst having a ceria support for use in the water-gas-shift reaction. In a preferred embodiment, the process involves providing "clean" precursors as starting materials in the catalyst preparation.

Remarks Regarding Claims Rejected Under 35 USC §103(a)

The Examiner has rejected claims 1 – 8, 11 – 17, 19 and 20 under 35 U.S.C. 103(a) as obvious over Igarashi (JP2000-342968, EP 1 161 991) in view of Silver (U.S. Patent 6,455,182, "the '182 patent"). Applicant respectfully contends that the Examiner has not met the burden of rejecting the claims of the present application under 35 U.S.C. 103. The prior art references do not suggest the desirability of making the combination necessary to create the present invention. To combine the prior art references to reach the claims of the present application, it is necessary to apply impermissible hindsight vision afforded by the claimed invention. In view of the present application, and only in view of the present application, is there a reasonable expectation of success. Thus, applicant respectfully requests that the rejection of the claims under 35 U.S.C. 103(a) be removed and the claims as currently pending be allowed.

The Claimed Invention of the Present Application

The claimed invention requires that the catalyst includes a primary transition metal, a transition metal promoter, and a support comprising cerium oxide and an additive. That is, the claimed invention takes the primary transition metal and the transition metal promoter catalyst

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combination taught in the '991 application and further combines it with the cerium oxide comprising support, which may include a second oxide, taught in the '182 patent. Although the prior art cited by the Examiner forms the basis for the present invention, the references fail to provide any teaching or suggestion for the combination that is now claimed.

JP2000-342968, EP 1 161 991 Application

The '991 application teaches a catalyst for a water gas shift reaction wherein the catalyst comprises at least platinum on a metal oxide support. As noted by the Examiner, the '991 application teaches that platinum may be used in concentrations ranging from 0.1 wt% to 10 wt% (paragraph [0012]) and that rhenium – added in concentrations ranging from 0.1 wt% to 10 wt% – may be used in addition to the platinum (paragraph [0013]). Example 17 of the '991 application teaches an embodiment wherein a zirconia carrier supports 3.0 wt% platinum and 1.0 wt% rhenium.

But, the '991 does not disclose the use of a support comprising cerium oxide. Rather, when the '991 application is considered as a whole, the possibility of including cerium oxide in the support material appears to be rejected by the inventor based on the express recitation of possible metal oxide supports, but excludes ceria (cited are zirconia, alumina, titania, silica, silica-magnesia, zeolite, magnesia, niobium oxide, zinc oxide and chromium oxide (see paragraph [0011] and also claim 2)). The cited references indicate that the inventor was aware that ceria was a known support material for platinum and rhenium water gas shift catalysts and *still* did not include ceria as one of the possible metal oxide supports for the catalyst of the '991 application. (The inventor of the '991 application referenced Bunluesin et al, "Studies of the Water-Gas-Shift Reaction on Ceria-Support Pt, Pd, and Rh: Implications for Oxygen-Storage Properties", Applied Catalysis B: Environment, vol. 15 (1998), pp. 107-114 (cited in the companion U.S. application 09/720,262, now issued as U.S. Patent 6,777,117).) Rather, the inventor noted that ceria could be used as a promoter for the catalyst.

U.S. Patent 6,455,182

U.S. Patent 6,455,182 (Silver) teaches a shift converter in a fuel processing subsystem for a fuel cell that includes a catalyst comprising a noble metal catalyst having a promoted support of mixed metal oxides, including at least both ceria and zirconia. But, in the '182 patent, the catalyst is identified as a "noble metal catalyst on the promoted support is selected from the metals of groups VIIb, VIII, and Ib of the second and third transition series of the periodic table,

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with platinum, palladium, rhodium, and gold being generally preferred, and platinum being particularly preferred.” Column 3, lines 7 – 11. This listing does not teach or suggest that combinations thereof may be used, but rather specifies individual noble metals.

The Examiner states that “it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the catalyst taught by the WO reference [the ‘991 application] to include the use of a mixed cerium oxide – zirconium oxide support as taught by Silver.” By the time the application that led to the ‘182 patent was filed, an English language companion to the ‘991 application had already been published (CA 2 336 847, published September 21, 2000). That is, the catalyst of the WO reference was in the public domain by the time the mixed cerium oxide – zirconium oxide support application was filed. Yet, the ‘182 patent does not teach or suggest that the metal combination of the ‘991 application could be used in combination with the support of the ‘182 patent.

JP2000-342968 (EP 1 161 991 Application) in view of U.S. Patent 6,455,182

“Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art... The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).” MPEP 2143.01.

The ‘182 does not teach or suggest, explicitly or implicitly, that a combination of a primary transition metal and a transition metal promoter catalyst may be used on a mixed metal oxide support comprising ceria. Rather, the ‘182 patent teaches a list of individual noble metals be used with a ceria-comprising support.

The ‘991 application does not teach or suggest, explicitly or implicitly, that ceria may be used as an additive to the catalyst support, although ceria-comprising supports were known by those skilled in the art at the time the ‘991 family of applications was filed.

The inventors of the ‘991 application and of the ‘182 patent are acknowledged to be skilled in the art of water gas shift catalysts. However, neither the inventor of the ‘991 application nor the inventor of the ‘182 patent saw fit to suggest the combination that is now claimed in the present application even though the knowledge was generally available to one of ordinary skill in the art at the time the reference applications were filed.

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It is the combination that forms the present claimed invention, and the "mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." Applicant contends that the claimed invention can only be deemed as obvious by use of hindsight – not be any prior art suggestion of the desirability of the combination. Moreover, the applicant has noted surprising results from the combination as stated within the specification at page 8, lines 15 – 19: "In the present development using a platinum primary metal and a rhenium promoter, it has been found that a cerium zirconium oxide support which is rich in zirconium, *i.e.* in which the weight percent added to the support by the zirconium is greater than the weight percent added to the support by the cerium, demonstrates surprisingly improved levels of CO conversion without concomitant significant methane formation."

Thus, applicant maintains that the pending claims of the present application are not obvious under 35 U.S.C. 103(a) based on Igarashi (JP2000-342968, EP 1 161 991) taken alone or in view of Silver (U.S. Patent 6,455,182, "the '182 patent").

In view of the foregoing, applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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